

## RESEARCH ARTICLE

# The potential for Assemblage thinking in population geography: Assembling population, space, and place

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## Abstract

This study explores “Assemblage” thinking as an approach to population geography research. The paper highlights the recent prominence of Assemblage thinking in human geography, before exploring the potential opportunities for engagement by population geographers. In particular, we focus on the production of place as co-constituted by the material (space) and the discursive (knowledge, process, and practice). Considering the Assemblage practice of “Rendering Technical,” we reflect on the role that population geography plays in authorising knowledge and supporting policy. This is investigated through a critical taxonomic analysis of recent Scottish demographic data. It is argued on the one hand that this captures key economic and population characteristics of “place,” while on the other hand, it offers a limited technical knowledge. We conclude that a reflexive approach to research using Assemblage thinking may challenge the intimate relationship between population geographers and the state.

## KEYWORDS

Assemblage, coastal communities, emergence, geodemographics, migration

## 1 | INTRODUCTION

This paper explores “Assemblage” thinking as an approach to research in population geography. A very basic description of Assemblage thinking might be that it is a relational approach to research, which seeks to understand how traits of population spaces emerge. A key starting point is to take persistent configurations as relatively stable assemblages and then examine the contingent conjunction of different components. This is done by analysing the processes and practices of these population spaces, deploying concepts (such as territorialisation–deterritorialisation) to understand the relative roles that social and demographic processes play and encouraging critical reflection on these processes, drawing on the resources of relational and critical theory. The paper critically discusses the benefits of engaging with Assemblage thinking for the field of population geography, thereby opening up discussion of how relational thinking can be incorporated into the tools of a policy relevant subdiscipline.

Facing an increasingly impact-driven future, population geography brings a strong disciplinary foundation of engaging with those outside

of academia. The ways of knowing in population geography have traditionally aligned to policymaking and planning. The relationship has been mutually beneficial. The field has had access to an abundance of data rarely seen elsewhere in human geography, and by the nature of the data available, the technical knowledge we produce feeds back into policy systems (Abram, Murdoch, & Marsden, 1998; Bailey, 2005; White & Jackson, 1995).

It is instructive to consider a series of “turns”—linguistic, narrative, and relational (Little, 2016)—drawing on different philosophical frameworks and assumptions, which have guided the practice of social sciences. These “turns” in social science have also been part of the subdiscipline’s recent history, with calls for population geography to engage with social theory and conceptual developments, which could shape “new” population geographies (Findlay & Boyle, 2007; Findlay & Graham, 1991; Graham & Boyle, 2001) by seeking out the population issues at the heart of new social theory (Findlay, 2003). The relational “turn” and its ontologies were set out by Bailey (2005) as part of population geography’s theorised future. This provides the potential to broaden the conceptual understanding of

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place/space whilst continuing to stay relevant to the demographic questions that matter to society. Yet *Population, Space, and Place's* engagement over the last 10 years shows limited evidence of embracing this vision despite claiming to be the flagship journal of population geography.

The paper begins with an introduction to the Assemblages literature and its use within social sciences in general and human geography in particular. The paper then reflects on population geography's limited engagement with Assemblage thinking and explores its potential. Through our impact-driven typology of Scottish coastal demographics, we explore how traditional demographic knowledge has something to offer to relational thinking, as well as its limitations. We draw on ideas from assemblage thinking to critique the knowledge practices of population geography—particularly how population spaces are conceptualised; and finally, we reflect on the opportunity for Assemblage thinking and relational approaches more generally to enhance population geography.

## 2 | ASSEMBLAGE THINKING AND POPULATION GEOGRAPHY

There have been notable advances in opening up the dialogue between population geographers and social theory. For example, Shubin (2015) explores the space–time aspect of the life course, drawing on Heidegger and notions of time consciousness. Other population geographers have applied the thinking of Foucault to population geography (Crampton & Elden, 2012; Legg, 2005; Tyner, 2009). Noteworthy is the use of Foucault within the work of Philo (2001) and more recently Legg (2005), in retheorising the slippery relationship between population, space, and place. We argue in this paper that Assemblage thinking has potential to extend and enrich population geographers' conversations involving social theory.

"Assemblage" is a term that has been used to describe how things are grouped together. Specifically, "assemblage" is used when there is recognition that multiple drivers of change are taking place and interacting with one another. Assemblage "theory" (in contrast with the "term" assemblage) goes well beyond a description. It has been deployed by researchers attempting to offer explanations through an analytic approach that seeks to capture the complexity of the world (Anderson, Kearnes, McFarlane, & Swanton, 2012b; Anderson & McFarlane, 2011; Dewsbury, 2011). The origin of Assemblage thinking in social science has been attributed to the French philosophers, Latour, Deleuze and Guattari, and has been characterised by philosophers of social science as part of the "relational turn" within social science. DeLanda is also credited for the growing significance of the discourse, notably reworking Deleuze and Guattari into Assemblage theory (DeLanda, 2006, 2016). DeLanda's writings on Assemblage ontology have engaged scholars beyond relational approaches, in particular, those from critical realist and speculative realist traditions (Allen, 2012; Anderson, Kearnes, McFarlane, & Swanton, 2012a; DeLanda, 2016; Harman, 2008).

There is a clear progression in relational thinking and network concepts; networks that were "closed" in a structuralist approach became "open" through the introduction of post-structuralism and relational thinking (Murdoch, 2005; Yeung, 2005). The theories that used open networks

also became more comprehensive over time moving from social network theory to actor network theory (ANT; Bosco, 2006). Latour's ANT represented the layers of socialisation built-up through linked networks to illustrate the complexity of the modern world and, as such, is often considered a form of Assemblage thinking (Farias & Bender, 2012; Müller & Schurr, 2016). However, critics of ANT highlighted that the concept fails to sufficiently address the capacities of the environment and space outside of the network, or lack thereof (Ingold, 2008; Lai, 2016; Murdoch, 2005). Despite these drawbacks, most human geographers welcome the new insights that Assemblage thinking provides (McFarlane, 2009).

The so-called "modern population geography" (Rossini, 1984) defined population spaces and places as a passive context within which demographic events were recorded. Frequently, this geographic perspective treated "space" as a "container" bounding the statistical occurrence of births, deaths, and migration, allowing a progression to the comparison of population spaces through the classification of demographic measures (Clarke, 1965). In other population geographies of this era, space was treated as "codex" (Bailey, 2005, p. 27). By space-as-codex, we refer to research that uses proximity and structure of objects in spaces as code for analysis, with physical distance between locations (and the imagined physical properties associated with distance) used to define "population spaces." This deals with both absolute space (characteristics of place) and relative location (spatial structure of settlements) to analyse patterns of change across space (as well as in time), for example, spatial distributions of disease or populations (Bailey, 2005, p. 30–31). Holistic interpretations of the interdependence of population, society, and environment also led to narratives discussing the similarities and differences between "population places" and sometimes to the identification of "essential" characteristics of populations found in particular kinds of places (Noin, 1979). Although there has been a dramatic improvement in the sophistication of analyses, many contemporary assessments of population change continue to be based on this way of thinking about space and place as passive contexts. Examples include the classifications of space and place, based on decennial census reports published by government statistical agencies. By contrast, relational approaches in human geography have unleashed new visions of space and place as actively "answering back" (Bailey, 2005, p. 164) through the socio-spatial relations of actors and networks at various scales (Heley & Jones 2012; Yeung, 2005). These developments in human geography must be situated in the ongoing conceptualisation of space and place, in particular, the theoretical insights of relationality, power, actors, and space–time, which have built on relational thinking (Bosco, 2006; Murdoch, 2005). The production of place as co-constituted by the material (space) and the discursive (knowledge, process, and practice) breaks down the structuralist dichotomies of agency/structure and nature/society (Anderson & Wylie, 2009; Bailey, 2005; Bosco, 2006).

The adoption of "Assemblage" within the field of human geography has been a more recent conversation. Scholars have investigated how this approach can contribute to discussions of scale and address questions of emergence, including concerns of governance and practice, to refocus on the "how" questions (Anderson & McFarlane, 2011). The 2011 special section of *Area* dedicated to Assemblages clearly demonstrates the extent and diverse reach of

Assemblage thinking even in its infancy (Allen, 2011; Anderson & McFarlane, 2011; Greenhough, 2011; Legg, 2011; McCann, 2011; McFarlane & Anderson, 2011). Many of these developments seem to be concentrated within the subfields of political and urban geography.

## 2.1 | Population geography: Space for assemblage thinking?

There is a noticeable absence of population geographers in the growing “Assemblage” discourse. Although Stockdale (2016) more broadly discusses the need for relational approaches in population geography that deal with the complexity and messiness of migration issues, there have only been two papers that explicitly mention Assemblage thinking currently published within population geography journals (Bilecen & Barglowski, 2015 and Bork-Huffer, 2016: both in *Population, Space, and Place*). Readers should find this surprising given that Assemblage thinking rings true to Bailey's (2005) understanding of how knowledge and power might operate within a relational population geography.

However, the limited engagement of social theory in its various guises is not a new observation in population geography. Indeed, 20 years ago, White and Jackson (1995) called for us to (re)theorise population geography, given a concern that the subdiscipline was seen to be drifting away from other parts of human geography. Their paper suggested this was in part due to the data abundance enjoyed by population geography in contrast to other subdisciplines. This was seen by White and Jackson (1995) to have encouraged traditions of quantitative methodological rigour and advancement, but lack of attention to broader social theory. This bold piece of work set the tone for *IJPG*, now *Population, Space, and Place* (PSP) as it set out to address this imbalance.

In the following 20 years, the abundance of data has continued to grow, as has the array of techniques for visualising and analysing demographic data sets. Notably, there was a celebration of such data at the recent International Conference on Population Geographies 2015 in Brisbane. The plenaries included themes on “Big Data” (Swanson, 2015) and international data projects such as the “Global Burden of Disease” study (Lopez, 2015). So has population geography

been able to get out of its “intellectual ghetto”? (a term used by White and Jackson, 1995, p. 112).

In 2004, the journal made a semantic leap away from “geography” and “space-as-codex” to a journal that in the new title focused on “space and place.” A (re)focus on social relations, highlighted in Bailey's (2005) work, now became evident in the journal. Boyle (2014; then co-editor of PSP) reflected on taking this “risk” as follows: “The use of ‘Place’ as well as ‘Space’ was designed to encourage more qualitative researchers to engage with the journal” (Boyle, 2014, p. 677). However, one might question the focus on methodology rather than theory, when the pace of progress made to achieve the goal of a retheorised population geography has remained slow within PSP, despite the change in its name. For example, in PSP's 2015 issues (excluding special issues), the majority of papers engage with population spaces as codex: across both qualitative and quantitative papers (Table 1).

The challenge remains to put into practice Bailey's (2005) vision for a reshaped population geography. Thus,

*Relational views of knowledge had particular salience for a geography project long committed to a Kantian search for meaning in proximity and context. As order and disorder could make each other, space (and time) lost ontological primacy and were no longer “out there, then” but “here, and now.” Contingency and context mattered.*  
Bailey (2005, p. 111)

Reflecting on the above quote, we propose that Assemblage thinking is a relational approach that has promise to contribute to the subdiscipline's development beyond space-as-codex. DeLanda (2006, 2009) talks of persons and networks as the most quintessential Assemblage. He conceptualises social Assemblages, stating they must “at the very least involve a set of human bodies properly orientated towards one another (physically or psychologically)” (DeLanda, 2006, p. 12). They are multiscalar: individuals, households, communities, towns, cities, regions, and nations (DeLanda, 2009; Farias & Bender, 2012). In this way, Assemblage thinking provides an example of new social theory, which has population at its core and, as Findlay (2003) suggests, offers the greatest potential to increase the pace of progress. Assemblage thinking recognises that populations are inherently involved with the practices and knowledge systems embedded within

**TABLE 1** *Population, Space, and Place* articles 2015 addressing space-as-codex: By methodological approach

n = 33	Conceptualisation and understandings of space and place		
	Space-as-codex	Use of social theory (including life-course)	Other
Quantitative approaches	13 <sup>a</sup>	3 <sup>b</sup>	5 <sup>d</sup>
Qualitative and mixed method approaches	0	4 <sup>c</sup>	8 <sup>e</sup>
Total	13	7	13

Note. Articles from PSP special issues (issues 3, 5, and 7) were not included in this review.

References:

<sup>a</sup>(Amcoff & Niedomysl, 2015; Bell et al., 2015; Camara & Garcia-Roman, 2015; Clark, Duque-Calvache, & Palomares-Linares, 2017; Johnston, Poulsen, & Forrest, 2015; Mberu & Mutua, 2015; Mezger Kveder & Beauchemin, 2015; Midouhas & Flouri, 2015; Snel, Faber, & Engbersen, 2015; Svensson, Lundholm, De Luna, & Malmberg, 2015; Wang, Guo, & Cheng, 2015; Wilson, 2015; Yang, Noah, & Shoff, 2015)

<sup>b</sup>(Argent & Tonts, 2015; Coulter & Scott, 2015; Schapendonk, 2015)

<sup>c</sup>(Jöns, 2015; Newbold, Watson, & Ellaway, 2015; Pásztor, 2015; Wang, Tang, & Li, 2015)

<sup>d</sup>(Barakat, 2015; Charles-Edwards & Bell, 2015; Christopher & Leslie, 2015; Hochstenbach, Musterd, & Teernstra, 2015; Wesolowski, 2015)

<sup>e</sup>(Eimermann, 2015; Frändberg, 2015; Gkartzios & Scott, 2015; Harris, 2015; Holton, 2015; Lietaert, Broekaert, & Derluyn, 2015; Marcu, 2015; van Houte, Siegel, & Davids, 2015)

the spaces and places that they occupy. Populations and their social processes come together at each level, individuals in each Assemblage and indeed the Assemblages themselves often belong within other scales (McFarlane, 2009). Assemblage thinking's use of contingency and emergence may offer ways to show how such social processes shape each other in a non-linear way and create heterogeneous populations spaces and places that are trans-scalar.

## 2.2 | Engaging population geography—A starting point

One starting point to apply these ideas from assemblage thinking is to consider "population places" as both material and discursive, as we have argued. In this way, both the processes and practices of Assemblage offer potential for population geographers to better understand and respond to the material spaces we research. We therefore now provide examples of what we as authors understand as key processes and practices of Assemblage and their relevance to population geography.

We begin by providing a short summary of four key conceptualisations related to process within assemblage thinking: emergence, de-/territorialisation, de-/coding, and contingency. First, Assemblage thinking is a social theory driven towards understanding emergence as the process of maintaining and shaping the identity of any given Assemblage, including population spaces. Emergence is different from change in the planned form. Emergence is recurrent, a slow replacement where the capacities of the whole are realised through the mobilisation of relations and resources. (DeLanda, 2006; Dittmer, 2014).

The second set of processes is territorialisation and deterritorialisation. Territorialisation is conceptualised as a process that serves to stabilise the Assemblage and its identity. This can be achieved by either increasing the homogeneity of the parts or reinforcing the sharpness of the assemblage's boundaries (DeLanda, 2006). In regard to spatial territorialisation and clarifying the boundaries of any assemblage, this aspect is inherently geographical (Anderson & McFarlane, 2011; Müller, 2015). By beginning to spatialise Assemblage as a social theory, it highlights the importance of places and their internal processes and therefore validates Assemblage as an appropriate means of enquiry for population geographers as "Settled places and regions however arbitrary are the essence of human geography enquiry" (Pred, 1984, p. 279). We can view populations as inhabiting spatial territories where the boundaries are defined by both the administrative bodies and natural landscapes. The boundaries prescribed by administrative bodies have often been shaped by a historical co-evolution of place and population, but are not fixed or defined by those that occupy them. They are therefore more likely to be contested. This brings us to "deterritorialisation," which is any process that destabilises and works towards dismantling boundaries and creating further heterogeneity within the Assemblage.

Next, we consider the concepts of coding and decoding, which provide a tool to analyse the roles that are played by social and demographic processes, in order to reach a causal analysis. A process which is "coding" will consolidate and increase the rigidity of an Assemblage, whereas a process with a "decoding" role will allow for a certain degree of flexibility within the Assemblage operations. Explanations from coding and decoding axis will often involve reasons and motives, which are

recurrent and can drive emergence (DeLanda, 2006). It is here that the fourth concept, contingency becomes important. Assemblage thinking discards the assumption that a particular cause will always have the same effect, or will always produce the same outcome. Causes are understood as events (that are necessary but not sufficient for change). They are disturbed by other contingent internal and external happenings (Anderson et al., 2012b; Bear, 2013). Therefore, it is important to consider how these processes take shape. How this occurs in populations over space-time is determined by the nature of the practices and parts of the Assemblage.

The focus on practice/s is important when considering Assemblage as a relational approach, often praised for its strength in addressing a somewhat Foucauldian focus on "the how" (Anderson et al., 2012b; Li, 2007). This in many ways has helped the increasing prominence of assemblage thinking in social science writings, yet there are few who have theorised a set of practices for place-based assemblage thinking as well as Li (2007). Li (2007, p. 265) describes six practices of Assemblage: (a) Forging Alignments, (b) Rendering Technical, (c) Authorising Knowledge, (d) Managing Failures and Contradictions, (e) Anti-Politics, and (f) Reassembling. Li sees these practices as one way of advancing the analytic basis of Assemblage thinking. These practices have been developed alongside political-spatial and governance discourses.

However, we argue that these practices apply to other place-based assemblages relevant to population geography and related research fields (Prince, 2014). A key strength of the practices theorised by Li is that they are able to draw out the relationality of research—in particular, the role that knowledge creation and dissemination have in the processes of an Assemblage, particularly emergence, or lack thereof. These are practices with the ability to reveal power and agency in population geography (Legg, 2011).

We argue that "Rendering Technical" and the closely related practice of "Authorising Knowledge" resonate within population geographer's impact-driven collaborations, in particular, those that utilise traditional approaches. "Rendering Technical" is described by Li (2007, p. 265) as "extracting the messiness of the social, with all the processes that run through it, a set of relations that can be formulated as a diagram in which problem (a), plus intervention (b), will produce (c) a beneficial result." Technical knowledge creation, where information about society is often quantified and presented as scientific or statistical through the methods used to process it (increasingly the use of ICT software to compute advanced quantitative approaches), is a practice that is "Rendering Technical." Technical knowledge practices have the potential to distance the knowledge from "most people" and feed into the intellectual and political hierarchies of a knowledge society (Abram et al., 1998; Böhme & Stehr, 1986). These practices are embedded in the planning and policy systems and use technical processes to engage specific actors in the network. This conceptualisation was deployed by Prince (2014) to understand how cultural assemblages have been rendered technical—where the increasing use technical knowledge was practiced as a way of taking a complex issue and creating control, standardisation, and reproduction by reducing participation in culture to numbers. The technical knowledge, produced by "experts," is then framed as evidence rather than recommendation; in doing so, it can depoliticise issues and provide a selective focus for intervention. When Brown, Craddock, and Ingram (2012) talk about the assemblage of global health security, the authors

frame rendering technical as a way of inhibiting emergence. They demonstrate how the practices of policymakers can frame emergence as risk, which must be contained through other knowledge practices in order to maintain health security.

These examples provoke reflection on how practices of rendering technical could exist within traditional approaches in population geography. This links back to Bailey (2005) and where populations have too often in the past been reduced to numbers and characteristics, detached from the discussions of space (material, economic, and social) and place. Likewise, "Authorising Knowledge" and the nature in which knowledge practices can confirm enabling assumptions and contain conflicts and critiques of an Assemblage results in an inhibited process of emergence (Brown et al., 2012); this links into debates about the path dependence of population spaces. Lastly, in highlighting this work, we also hope we can lead our readership to see the ties with Foucauldian social theory more frequently used to frame the work of population geographers. Legg (2011, p. 131) has highlighted that Li's six practices blur the divide between Assemblage thinking and Foucault's *apparatus*, which he then (re)frames as an assemblage approach stating that the two conceptualisations "emerge as one and part of each other."

Population geographers using Assemblage thinking (whether incrementally or radically) need to recognise the practice of producing technical knowledge and consider the complex impact our research has. Greenhough (2011, p. 135) highlights the strength of Assemblage approaches to do this stating: "The importance of studying such relations and Assemblages is not (as some critiques of relativism suggest) to celebrate complexity but 'to become worldly and respond.'" This may be interpreted as a call to engage deeply with complexity, through the recognition of how our own knowledge practices impact the social worlds we research. Reflecting on the concepts above, researchers doing Assemblage research can enhance a critically reflexive position within population geography. "Rather than reduce 'geography' to passive context, critical thinking urged scholars to explore how space, place and environment 'answered back' and shaped the kinds of knowledge that were produced as researchers encountered the objects of research. Relational views of the world challenged what is meant by geography, what was meant by population" Bailey (2005, p. 164).

Beginning with a traditional approach of composing a typology using a statistical clustering technique, the paper now addresses the social processes and practices of the Assemblage to understand population space/place. Through implementing the conceptual tools above and our self-critical reflection on the technical knowledge produced, we show the power that social theory has to enhance the significance of population geography.

### 3 | AN EMPIRICAL EXAMPLE OF TECHNICAL KNOWLEDGES

#### 3.1 | A typology of Scottish coastal population spaces

We have argued for an Assemblage approach in population geography, which would incorporate the technical knowledges of the subdiscipline

and therefore present a population example using a typology—a traditional method for classifying population spaces. Classifying populations using geodemographics is the basis for the production of spatial population knowledges for a variety of commercial, political, and planning applications (Singleton & Spielman, 2013). The design of our typology was multilevel. Level 1 followed a similar design to past examples of sociodemographic and economic typologies used in planning and policy. This allowed us to understand the limitations of these approaches in a real world example. Level 2 of the typology provided the opportunity to begin to incorporate two key themes from Assemblage thinking—emergence and contingency. This was achieved by completing a second analysis, which focussed on the social and dynamic characteristics of population spaces.

##### 3.1.1 | Coastal localities and the policy context

The empirical lens for this study is the Scottish coast and its population spaces. This is currently an active context in policymaking. The Scottish Parliament (2010) promulgated the Marine (Scotland) Act 2010 alongside the implementation of HM Government (2011) UK Marine Policy Statement in line with the European Union (2014) Directive on Maritime Spatial Planning 2014/89/EU. These policy drivers have implications for how Scotland manages and plans coastal areas. There is an increasing demand for a social evidence base for coastal regions to which this typology will contribute. Other demographic studies of UK towns, particularly in coastal policy contexts, have used a typological approach (Fothergill, 2008; Hindle, Salthouse, & Shorten, 2011; McElduff, Peel, & Lloyd, 2013; Scotland's Towns Partnership, 2015b; Shepherd, 2009; Tym & Partners and OCSI, 2011a, 2011b). There are therefore many precedents for using typologies to produce technical knowledges of population spaces.

This study used "localities" data as the "geography" for analysing Scottish population. These localities corresponded to the 629 recognisable settlements of Scotland (National Records of Scotland, 2015). The population criterion was set as places with 1,000 to 49,999 people and used to exclude large cities and populations under 1,000. Geographic information system analysis identified localities where the boundary either intersected or was within 2 km of the mean high water mark, based on precedent from other coastal studies (Hynes & Farrelly, 2012; Post & Lundin, 1996). This process produced a subsample of 149 localities.

## 4 | METHODOLOGY

### 4.1 | Creating a typology

The typology was primarily created through K-means clustering analysis. This is a data-driven clustering technique, which maximises differences between clusters. The resulting clusters have cases as similar as possible to one-an-other and are as dissimilar to cases in other clusters, based upon numerical distance between cases as represented by scores on the variables. The number of clusters dictates the number of centroids, and the distances are measured from these. The cases are grouped by minimising the distances to the centroids. The process is iterative and ends when all cases have been allocated to an optimal group (Scotland's Towns Partnership, 2015b). In this study, the



clustering technique involved repeating the process for different numbers of potential clusters. A judgement between too many particularities (clusters where  $n = 1$ ) and too much generality, was made for each level of the typology.

The first level of the typology used variables from the 2011 Scottish Census data, where appropriate composite category inputs were created, for example, the categories “Married with Children” and “Co-habiting with Children” were combined to form “Couples with Children.” This produced the final 15 variables with 60 category level inputs (Table S1, see URL). A K-means analysis was then run based on the Z-score for each variable, as this produced cluster groups in relation to the coastal average.

The second level of the typology also used the K-means clustering method described above. At this level, new variables were extracted from the 2001 and 2011 Scottish censuses, and an isolation variable was also introduced. Composite variables were used to counter the disaggregation in the 2011 Scottish census response categories. These allowed change variables to be calculated for the 10-year period. The change variables were calculated using a proportional change measure. Nine variables were formed from 62 category inputs (Table S2, see URL). This level addresses critiques of typologies as static methods: building on the precedent of both McElduff et al. (2013), who used a single dynamic variable of overall population change, and Crawford, Bradley, and Marcucci (2013), where a classification was the starting point to quantitatively explore the impacts of in-migration in the coastal South Carolina over time.

The final output was a cross tabulation of the Levels 1 and 2 clusters (Table 2). This provided a breakdown of the Level 1 cluster groups by the Level 2 social and dynamic profile of localities and created the final 13 subgroups (Figure 1). Table 2 provides an example of the data-driven descriptions produced for the five Level 1 clusters. The final 13 subgroup descriptions included proportional change variables and were analysed in comparison with the coastal average (149 localities) rather than a rate of statistically significant change. This is an example of how an incremental approach to Assemblage thinking can inform the method of analysis by examining change as ‘contingency’.

## 4.2 | Testing the typology—Community dependence measure

The typology thus far provides a means of data consolidation for the different demographic and socio-economic characteristics of “place”

in relation to how these characteristics are changing. Yet there is little indication of why these differences in “place” matter to a relational population geography. If the population spaces are to be treated as an Assemblage, as we have suggested, then there is an assumption that they have the emergent properties of the whole. The technical knowledge created in Figure 1 fails however to adequately capture either emergence or potentially emergent properties such as agency. Agency, in terms of population spaces, matters in order to address how powerful or powerless a place is in dealing with demographic and socio-economic challenges. Indeed, the differential capabilities identified by the typology come together within population spaces in different ways, thus affecting the capacity for emergent properties. In this study, we suggest that such independence/dependence can be seen as an emergent property of population spaces related to agency discourses. If a typology represents real differences in the demographic and social profile of “place,” then we would expect to observe different levels of agency and therefore different levels of in/dependence.

In order to investigate this assumption, the final step in our methodology was to test whether the different categories in the typology were shown to differ in relation to the in/dependence of the places they represented. This was done using a one-way analysis of variance (ANOVA) (Marsh & Elliott, 2008). This is not a directional measure. The independent variable was the cluster group. This was tested against “community dependence.” The community dependence measure is a score developed by Scotland's Towns Partnership (2015b) to measure in/dependence of places relative to the number of assets, diversity of business, and employment base of Scottish places using seven indicators. A key strength of this multivariate measure is that it captures a number of factors, but it generates less understanding of how the provision of these services is negotiated and maintained. Finally, a test of the homogeneity of variance was also completed to ensure the validity of the ANOVA. A significant difference between groups is expected in order to validate this assumption.

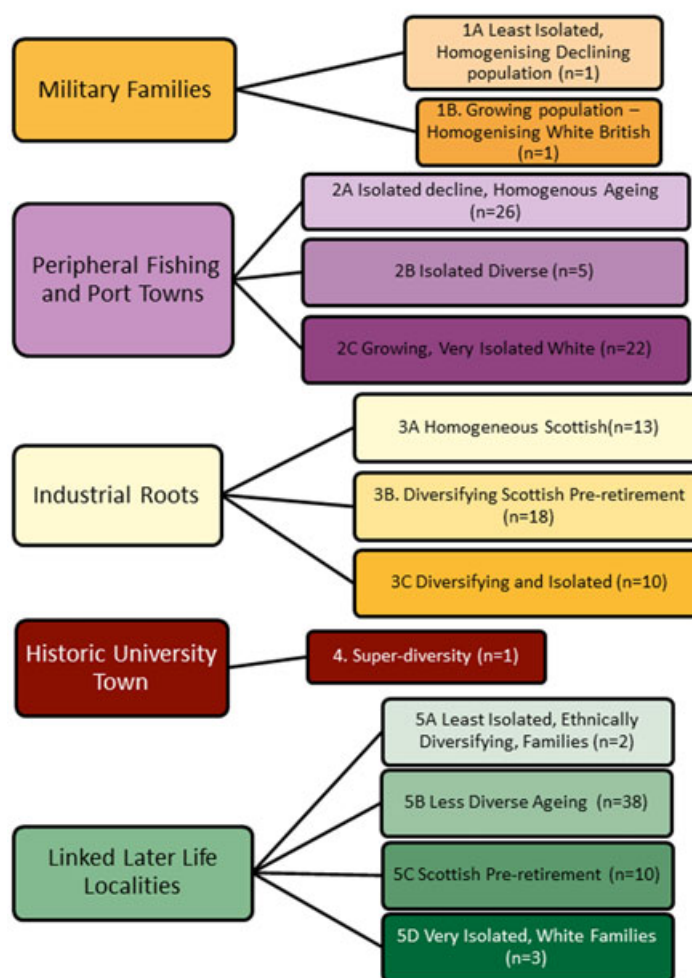
## 5 | A CRITICAL ANALYSIS

The Scottish coastal typology (Figure 1) presented here is an example of technical knowledge of particular use within the practice of Marine Planning, where understanding coastal population spaces is crucial to achieving the policy goals of a “strong, healthy and just society” in HM Government (2011) UK Marine Policy Statement and the EU

**TABLE 2** Creating a multilevelled typology—Cross-tabulation

		Cluster group from level 1				
		Military families Count	Peripheral fishing and port towns Count	Industrial roots Count	Historic university Count	Linked later-life localities Count
Cluster group from Level 2	Growing population—Homogenising White British	1	0	0	0	0
	Least isolated, ethnically diversifying, families	0	0	0	0	2
	Stable and least diverse, ageing population	1	26	13	0	38
	Less isolated, diverse preretirement	0	5	18	0	10
	Super diversity	0	0	0	1	0
	Very isolated, White homogeny	0	22	9	0	3

## A Typology of 149 Scottish Coastal Localities: Final Typology Schema



**FIGURE 1** A typology of 149 Scottish coastal localities: Final typology schema

Directive 89/89/EU (2014). We focus on what can be known from technical knowledges produced within the tradition of geodemographics and also on how this type of knowledge, paradoxically, may inhibit an adequate understanding of key aspects of population spaces.

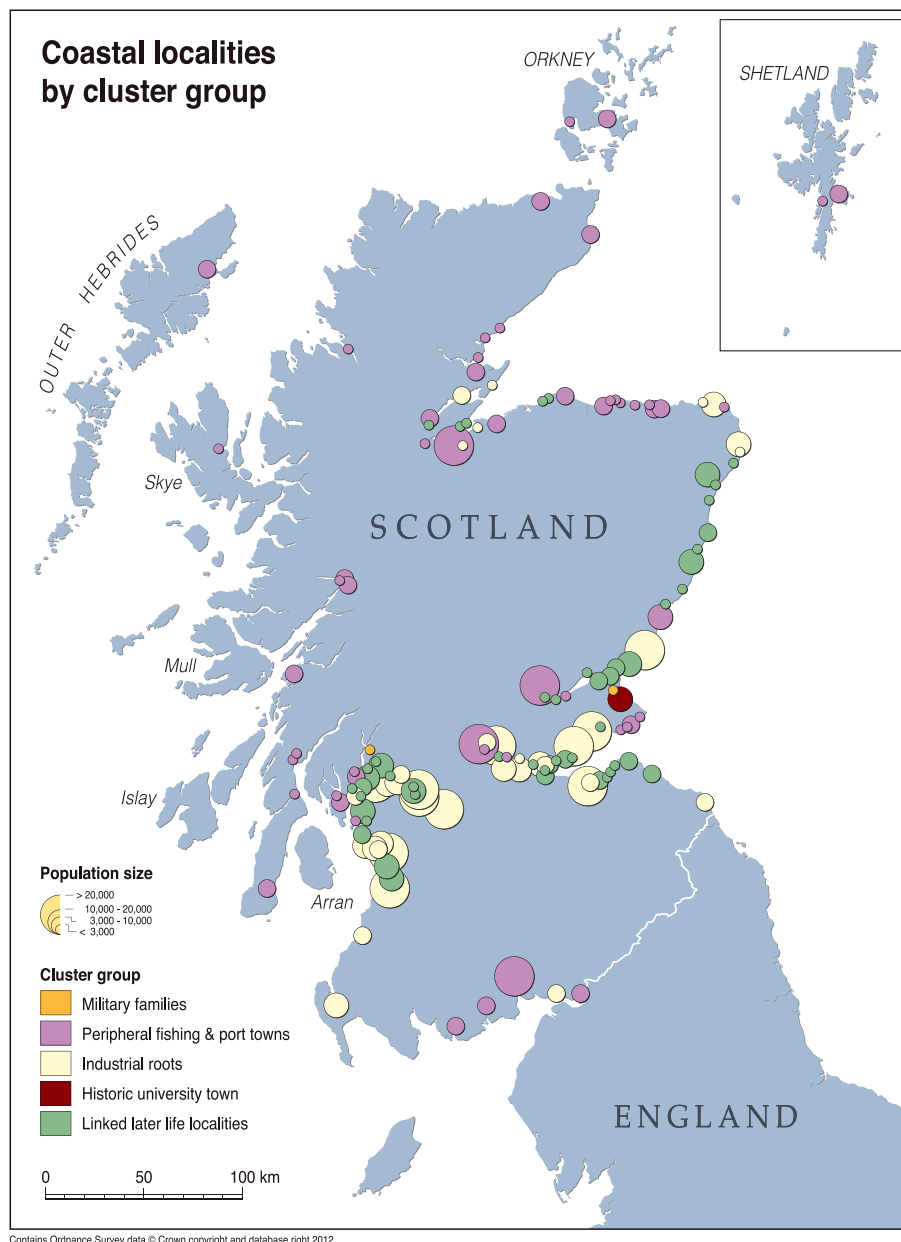
The first level of k-means analysis produced five clusters (Table S3, see URL). The five clusters were compatible with the dominant Scottish coastal town types evident in the contemporary literature (Scottish Executive, 2002). Some 146 of the 149 localities make up the three main groups: “*Peripheral Port and Fishing Towns*,” “*Industrial roots*,” and “*Linked Later-life localities*.” These 146 localities account for 83.4% of the coastal population (or 22.4% of Scotland's total population). There were also two outlying groups: “*Military Families*” and “*Historic University Town*.” The labels given to the Level 1 cluster groups were constructed from data-driven descriptions (Table S3). Reflecting on this process, we understand that the variables have labelled groups of places in a manner, which coincides predominantly with economic narratives explaining Scotland's coastal population. In contrast, the Level 2 groupings related much more closely to dynamic demographic processes and are of greater interest to Assemblage thinking.

Considering the “geography” of Scotland, there are some highly suggestive patterns in the Level 1 typology. In Figure 2, it can be

observed that the West Highlands, the North Coast, and Islands communities feature prominently within *Peripheral Fishing and Port towns*; the high concentration of *Industrial Roots* around the central belt; and the *Linked Later-life Localities* coalesce around Scotland's four main cities: Aberdeen, Dundee, Edinburgh and Glasgow. Therefore, the geographies of context play a role in the static socio-economic and demographic profiles of place. The dynamic and social characteristics of Level 2 also have a strong link to local contexts within Scotland. The paper now explores this further through examining three demographic themes: overall population change, ageing, and mobility.

## 5.1 | Overall population change

Demographic change is a key characteristic distinguishing the *Peripheral Fishing and Port Towns* cluster, from other communities (Figure 3). Localities around Inverness, the North-West Highlands, and the Scottish island populations are growing but have socially homogenous populations. In contrast, stretches of the coast with traditional fishing localities have experienced overall population decline. Examples include the East Neuk of Fife and the Firth of Clyde. Demographic change has impacted the social and economic sustainability of these population spaces.



**FIGURE 2** Map of Scottish coastal typology by Level 1 cluster groups

## 5.2 | Ageing

Ageing appears to be a key population dynamic in Cluster 5 (*Later-life linked localities*—Figure 5). This cluster group has the largest proportion of older people, particularly those over 65 years. However, this is unlikely to cause concern within the policy and planning sectors due to the low levels of deprivation within many of these localities. In contrast, in the more deprived localities of *Industrial Roots* (Figure 4), growth in the preretirement age groups is coupled with greater social diversity, indicating that the population faces potential social and economic planning challenges in the future.

## 5.3 | Mobility

The subgroup “*Diversifying and Isolated communities*” (Figure 4) highlights that both mobility and economic processes shape and

are shaped by place. These localities are those that often have a stronger tie to marine industries, including, for example, industrial-scale fishing or offshore energy. Over the period 2001–2011, the *Diversifying and isolated* subgroup experienced a significant level of immigration of White Eastern Europeans following the 2004 expansion of the EU, illustrating how global processes (international migration) connected to local economic opportunity shape the character of place.

In other clusters and subgroups, everyday mobility (commuting) can be seen to characterise place. The *Linked Later-life localities* (Figure 5) are all concentrated within commuting distance of the four main cities in Scotland, as well as around Inverness. For example, within this cluster, 83.65% of households have at least one car or van, and amongst the economically active, 62.01% travel to work by car. Some 68.11% of households reported travel to work distances of 10 km or more.



## 5.4 | Scottish coastal communities

Exploration of the patterning of the typology makes evident that place and space are related to the social and economic geographies of Scottish coastal communities (Figures 2-6). By (re)focusing on population within technical knowledge, we have illustrated that the demographic is shaping place in these spaces. This is important as it highlights the demographic challenges that coexist alongside wider economic challenges of coastal spaces.

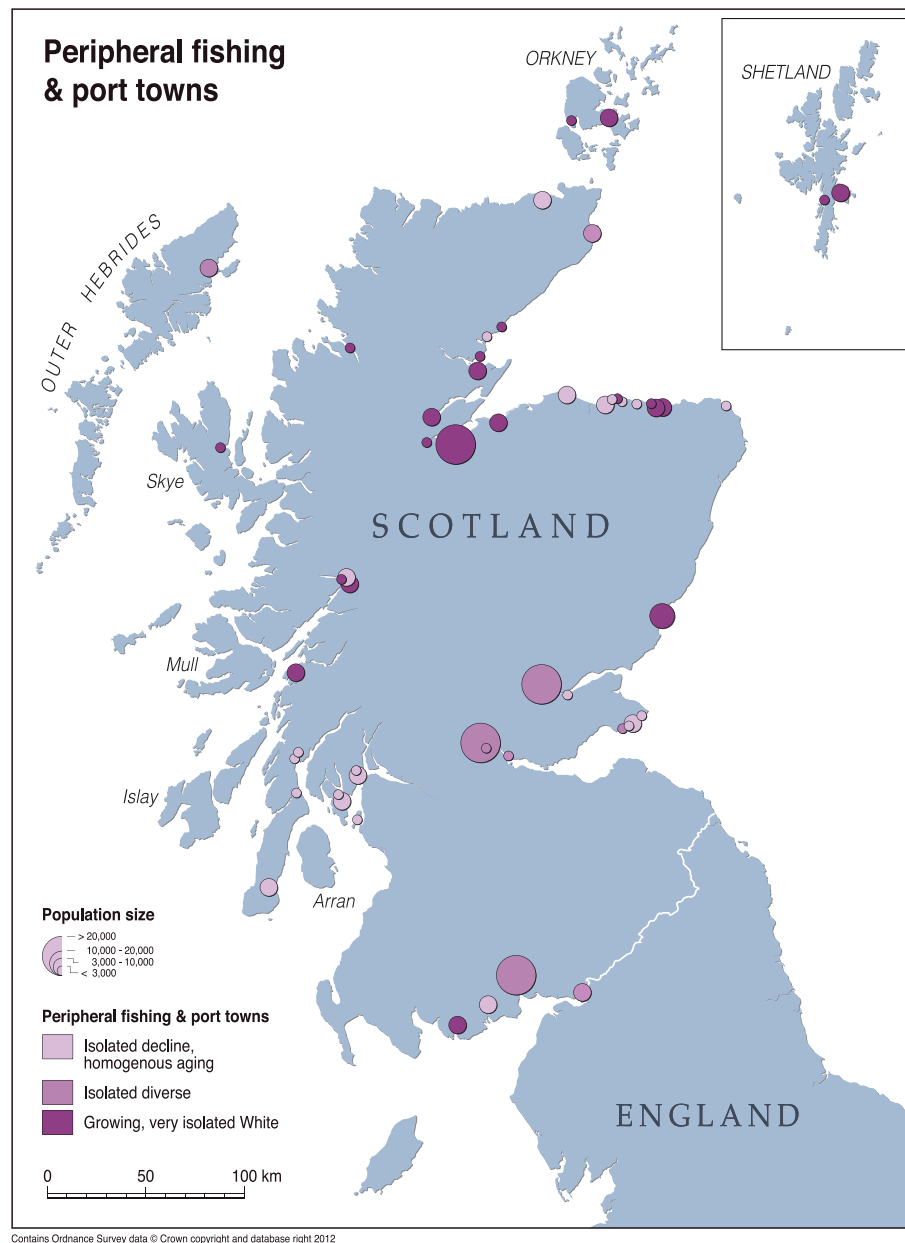
Clusters 1 and 4 are outliers (Figure 6). The *Military Families* cluster consists of two localities with military bases. Finally, the *Historical University Town* cluster is located and shaped within the historical and educational contexts of the university town of St Andrews. Assemblage thinking and ideas of the trans-scalar would encourage us to look to other scales of explanation for understandings of the demographic trends in these locations (for example, in

the case of St Andrews from examination of its context relative to the global differentiation of universities in an international hierarchy of higher education).

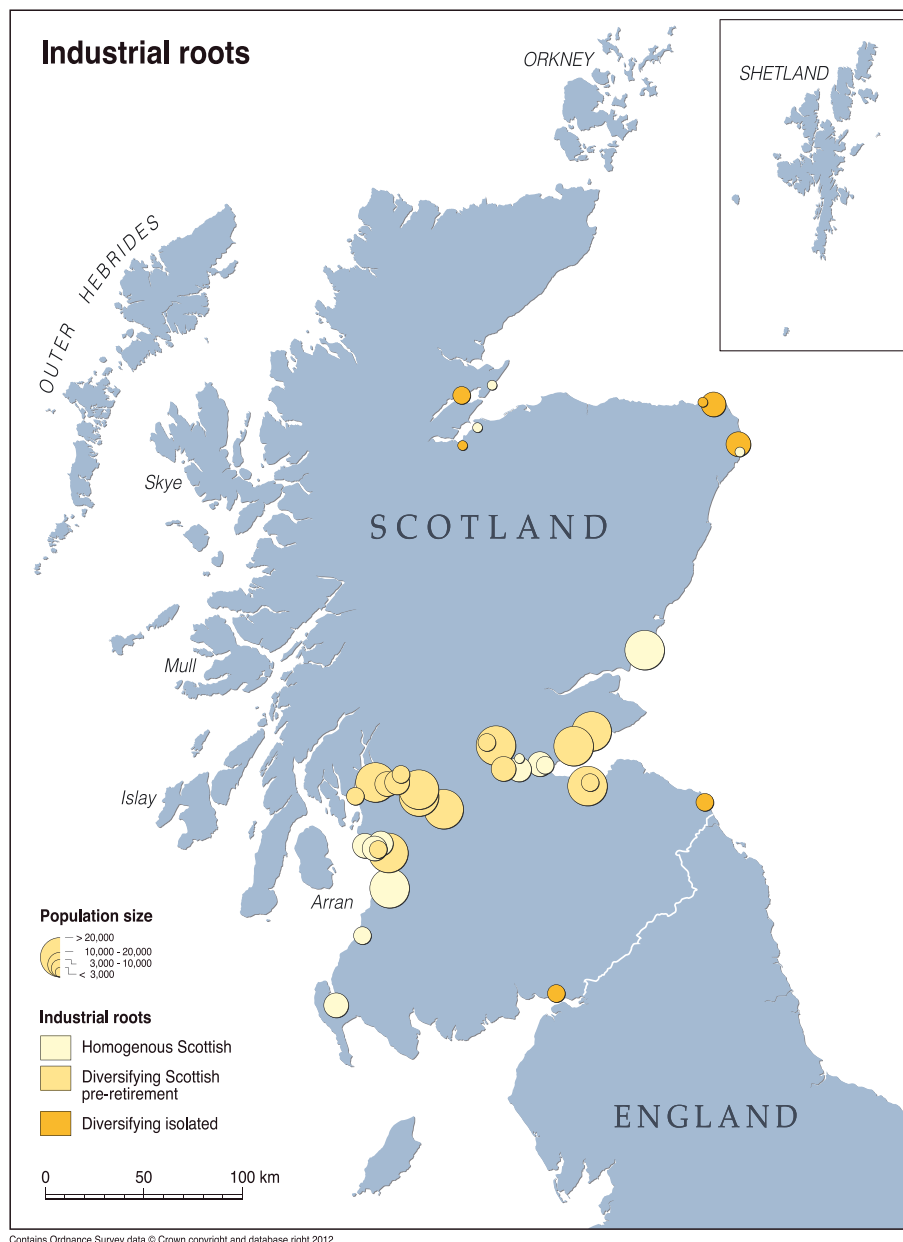
We must remember through the use of K-means that this empirical example is limited to using a tool that does not privilege statements of directionality or causality. It does not provide evidence of “the how.” In particular, how population spaces/places are produced from the relationship between demographic processes and context. We reflect more on this in the conclusions.

## 5.5 | Testing the typology: Adding agency

In Assemblage thinking, a place's capacity for agency would differ based on the potential relationships that could take shape (DeLanda, 2006). The demographic, economic, and social profiles of places



**FIGURE 3** Location of localities in “Peripheral fishing and port towns” by Level 2 cluster subgroups



**FIGURE 4** Location of localities in “Industrial roots” by Level 2 cluster subgroups

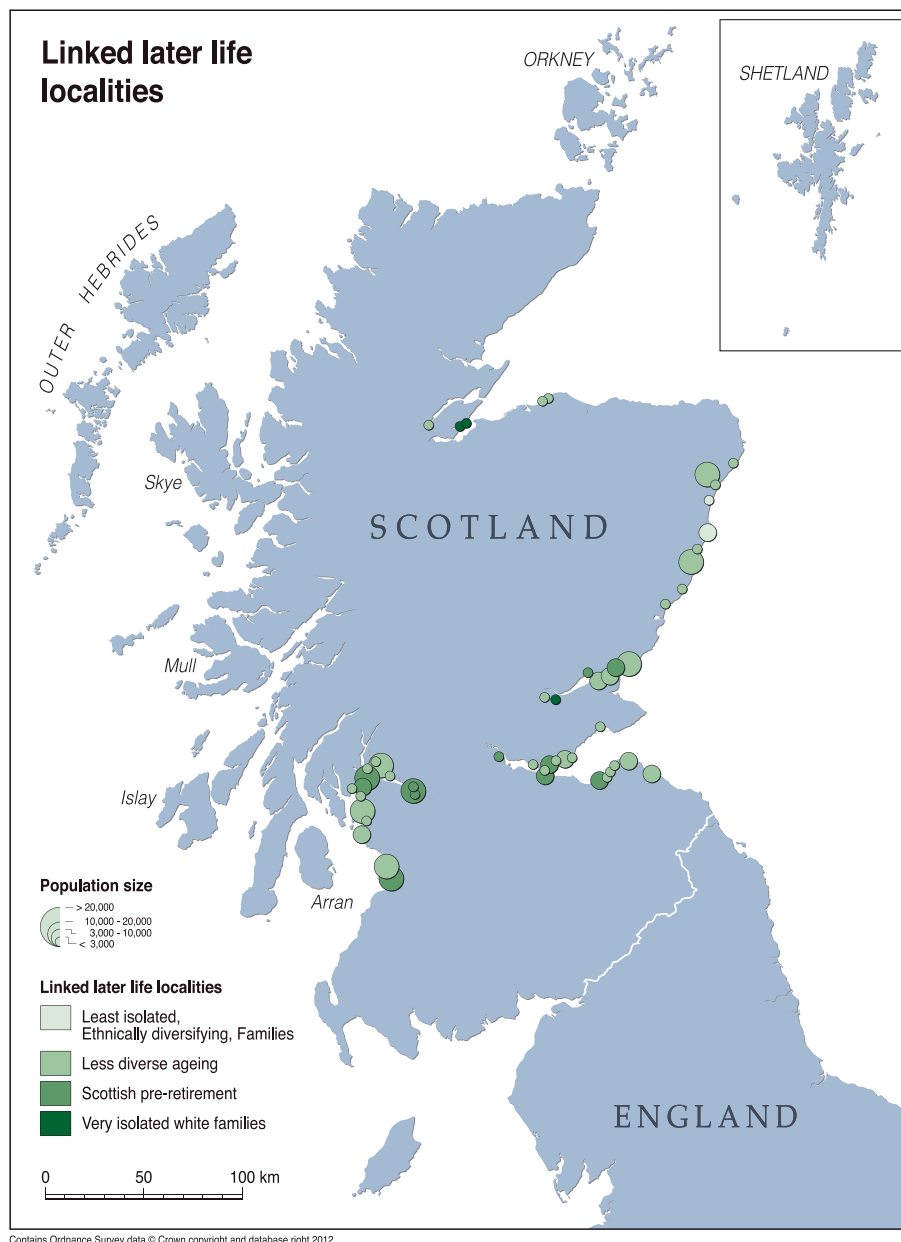
(represented by the clusters) promote or inhibit relations that shape these capacities. However, technical knowledge fails to capture the analytical coding that determines which relations make a place, where values and motives are shaping relations of these profiles in context. Further to this, the relations that exist between population spaces/ places and their proximate networks also affect the potential for agency to emerge within place. Therefore, testing the understanding of the similarities and differences produced by the K-means clusters against a measure of collective agency (the community dependence score) adds an additional dimension to understanding Scotland's coastal communities. This provides a means to explore to what extent these population spaces have capacity, as Bailey (2005:164) suggests, to “answer back.”

The difference in means (shown in Figure 7) was tested using a one-way ANOVA to see to what degree this observed difference was reliable and was statistically significant (Table S4, see URL).

Importantly, the reliability of these results as measured by the homogeneity of variance is improved by the integration of the second level of the analysis (Sig = 0.001).

The importance of looking at in/dependence that incorporates the material infrastructure of place to our understanding is to show that these places do not exist in isolation from each other or the broader network of towns and population spaces in Scotland (Sparks, 2015). The results from the ANOVA show that these places have varying levels of independence. The most dependent cluster was *Military Families*. This outcome was expected due to the strategic location of the facilities and the nature of the population of military personnel with their strong social ties to external population spaces.

In contrast, the highest level of independence was found in the *Peripheral fishing and ports towns*. These populations are distant in both space and time from Scotland's four main cities (as measured by



**FIGURE 5** Location of localities in “Linked later life localities” by Level 2 cluster subgroups

commuting and isolation variables). Therefore, there is a demand for essential services to be provided “in place.” Networks within this cluster are both economically and culturally rooted in the local traditions of the coastal spaces that they occupy. This can also be seen in subgroup 3c (*Diversifying and Isolated*), which feature larger localities linked to industrial scale fishing and offshore activities.

Most other sub groups for *Industrial Roots* and *Later-life Linked Localities* are represented as below “O” on the community dependence score showing a tendency towards dependence. This shows the importance of their proximity to urban centres. However, individual variation between groups is significant, indicating a need for the context of the demographic and social profile to be taken into account. This would enhance understandings of “how” in/dependence is lived out beyond the infrastructure variables that the measures focus on. This is particularly relevant when considering places that have an ageing population as measures could be designed to

build context-specific understandings of what dependence means (e.g., substituting primary/secondary education indicators for primary care provision). Sparks (2015) reflects on the Scotland’s Towns Partnership (2015a) and Scotland’s Towns Partnership (2015b) typology as requiring such context-specific knowledge in order to meet the needs of these towns. He adds that there is a need to supplement the typology with local knowledge. Sparks (2015) title that draws from Robert Burns’ *To a Louse*: “O wad some pow’r the giftie gie us to see oursels as ithers see us” provides a useful reflection of where agency is found within a typological approach. He argues that agency and power (which is initially missing from this top-down quantitative approach) can be regained from the knowledge it produces. For example, a local population can harness agency from knowing how those “in power” view “place” and take action to meet the needs of a community. With this in mind, we would argue that it is necessary to consider knowledge and, in particular, technical



**FIGURE 6** Location of localities in “Military families” and “Historic University town” by Level 2 cluster subgroups

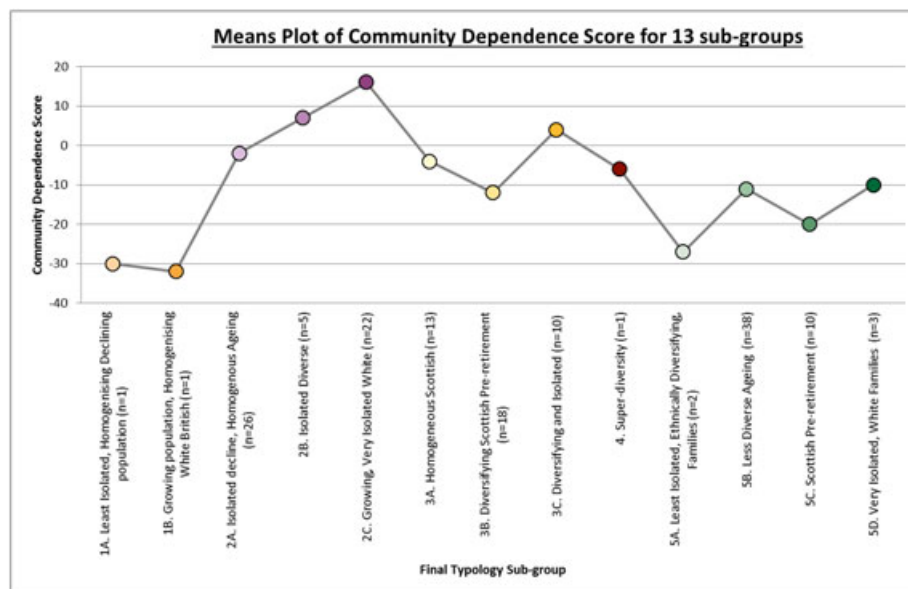
knowledge as “practices”—practices that can be negotiated to allow a place “to answer back” (Bailey, 2005; Li, 2007).

## 5.6 | Limitations of a typology

We now reflect on the practice of creating technical population knowledge. In this study, the typology has served mainly as a form of data consolidation: one that reaffirms existing understandings of coastal places and their similarities and differences (Table S3). The static nature of typologies makes it challenging to represent the shifting nature of population spaces over time. The multilevel design implemented in this paper has demonstrated that current understandings of Scottish coastal context are incomplete. Although many of the existing understandings are supported by the Level 1 evidence, the diversity of localities is determined by the demographic and social change taking place. This is key for policy-relevant research, as it

encourages planning for what places will become or indeed are becoming, rather than what they have been.

We first reflect on the practice of “labelling places” as part of the typology's creation. Through this, we, as researchers, can be seen to participating in the Assemblage practice of “Rendering Technical.” Labels are often the point of engagement with users of technical knowledge because they convey “take-home messages.” Population geographers have often sought for labels to be driven by the postpositivist truths of the data. This practice inevitably reflects the knowledges already encountered in the academy and in relevant policy fields. This is unsurprising, as researchers select appropriate data for policy or in relation to a perceived gap in knowledge. Therefore, we recognise that this typology is already subject to the linguistics of policymaking, through the ways in which data are organised and labelled over time. Impact-driven research builds on what is already known, through planning practices that are recurrent, using similar



**FIGURE 7** Means plot of community dependence score for the 13 subgroups

tools and narratives to disseminate “new” state-produced knowledge. Labelling places as a practice can therefore lead to path dependent understandings of population spaces.

In addition, we are acutely aware that these labels may change through the process of dissemination within government. Tym & Partners and OCSI (2011a, 2011b) reflect on their typology of England's East Marine plan area and the consultation process. Labels were subject to negotiation and driven by policymakers. Policymakers avoided any negative language around economic or social deprivation and instead focused on what was missing from their data, the future of these places. The Scotland's Towns Partnership (2015a) typology equally found that labelling became politicised and opted to have neutral, a-descriptive labels (just letters and numbers). These are clear examples of how knowledge practices code or decode population spaces as Assemblages: Political knowledge shapes wider society through the use of specialist knowledges of people and place.

There are other examples of “Rendering Technical” that we found when reflecting on the typology through the lens of Assemblage. The practice of using of state-produced knowledge, such as the census, is common within population geography, for reasons already mentioned in the paper. State-produced knowledge can be seen to strengthen the impact potential of the discipline's research through the familiarity of data sets within policymaking and a clear alignment to policy needs. However, it also brings with it other limitations that are worthy of note when considering how this example adds to a relational population geography. First, state-produced knowledge has exhibited an inability to move away from space-as-codex. Space-as-codex is embedded into the practice of creating the knowledge; the data available at each of the geographical boundaries is determined by organisations (e.g., The National Records of Scotland). They are not flexible; indeed, to capture change over time, we must establish these spaces, aggregating datazones for comparison. Second, the nature of smaller coastal populations resulted in this empirical example's reliance on the Scottish census data. In this case, the level detail of

the data was privileged over frequency and access lags. This further limits findings of the typology in an Assemblage approach, where emergence and contingency understand that the relations and power that these communities command will often be rapidly changing. Lastly, these examples also contribute to the political assumptions about place and space (that have been key to debates in geography, see Massey, 2005). The above limitations allow us to reflect on working with data or a fixed set of scales produced by the state and their role in reinforcing the spatial reach of the power, which often encourages path dependency and narratives of a “natural history of place” (Brown, 2011; Lai, 2016; Pierson, 2000).

Considering these practices and the importance of emergence, we avoided labels of unrealised futures, mindful of the inability of this methodology to capture emergence of the capacity of Scottish coastal Assemblages. Instead, we used a multilevel design and labelled places to reflect both data-driven descriptions and the demographic and social processes that were driving change from 2001 to 2011. Overall, the practices involved in technical population knowledge creation tend to privilege the state as an audience and, as a result, may exclude certain groups or individuals from mobilising the knowledge of population spaces within the Assemblage. This is due to their limited understanding of the technical aspects of its creation. The top-down nature of this classification will therefore likely inhibit the capacities of population spaces (Abram et al., 1998).

## 6 | DISCUSSION

We now consider the ways which Assemblage thinking can advance how population geographers deal with technical knowledges and the understandings they produce through the conceptualisation of Assemblage practices and in particular “Rendering Technical” (Li, 2007). We consider how to implement the conceptual tools of Assemblage thinking and reflect on this process via social theory.



## 6.1 | Rendering Technical: A practice of population geographers

Many population geographers use advanced quantitative methods. Even seemingly less complex methods such as the clustering technique used within our research involve the researcher participating in socially constructed knowledge practices, practices that have implications for those we research. This is particularly important where population geographers seek to produce evidence for planning practice. "Rendering Technical" involves extracting relations from the complexity to problematise and create an intervention. This is often practiced by those in government who have appropriate technical expertise to advise on the benefit scenarios for the uptake of recommended interventions. This is closely linked to the third practice described by Li (2007) of "Authorising Knowledge," which seeks to understand how assumptions are confirmed and critiques are contained in order to smooth over conflicting processes. It is with these two practices that population geographers' traditional knowledges contribute, not as absolute understandings but as practices within the Assemblage.

This typology adds to existing examples (Brown et al., 2012; Li, 2007; Prince, 2014) where technical knowledge practices reveal emergence by reproducing behaviours and relations within an Assemblage, often in order to meet the motives of some of its parts. This is an example of coding. The perception of this knowledge is often that it is expert based, which creates a social expectation and performance as this flows through the Assemblage (McCann, 2011; Prince, 2014). The labelling and grouping-together of places that share characteristics is often motivated by government organisations desiring to mobilise policies in multiple places based on similarities. In turn, the government organisations or the "state" contribute to path dependency through these practices being recurrent in nature, whilst also limiting alternative capacities of place.

This can shape the agenda for intervention, by determining what "problems" we study and what demographic processes we politicise through knowledge creation (such as segregation or international migration). This results in "stickiness" (Boettke, Coyne, & Leeson, 2008; Lai, 2016), where the knowledge practices of policymakers and planners become embedded over the longer term. These practices can lead to processes that either territorialise or deterritorialise depending on how "population spaces" answer back to technically-produced knowledge, or to the policy and planning solutions that the technical knowledge supports.

## 6.2 | Potential for assemblage thinking

*Assemblage always exist within populations, however small, the population is generated by the repeated occurrence of the same processes. As the assemblages making up these collectives interact with one another, exercising a variety of capacities, these interactions endow the populations with some properties of their own, such as a certain rate of growth or certain average distributions of assemblage properties. DeLanda (2006, p. 16–17) (emphasis is DeLanda's)*

Populations as Assemblages transcend scale; individuals interact with kin to create households, who interact with each other to form neighbourhoods and so on. The relations of exteriority and the possibility to take part in neighbouring and larger Assemblages allow for formation of social entities. However, they are determined by how the act of "coming-together" is territorialised and coded.

The impact agenda has raised the profile of population spaces such as localities or the "community" as an appropriate scale at which to govern through. Such an approach, utilising the Assemblage's coding (the motives, desires, and beliefs of a population) can be mobilised to meet the objectives of those seek "impact" (Harris, 2014; Li, 2007). Therefore, whilst recognising the contributions of technical knowledges and how the practice of creating it is an important role for population geographers to reflect upon, we also should complement these with the strengths of relational approaches to capture the "people" and the relations that shape population geographies, for example, building on the work of residential mobility and moving desires (Coulter, 2013; Coulter & Scott, 2015; Coulter, Van Ham, & Findlay, 2013).

However, the appropriate scale for any particular population space or place-based Assemblage may not be accounted for in our traditional comprehensions of scale as geographers. As suggested by Bailey (2005), we would argue a (re)theorised population geography needs to be open to new conceptualisations of scale such as translocal (McFarlane, 2009). It is worthy of note that conceptualisations of the translocal and trans-scalar thinking has become prominent within recent issues of *Population, Space, and Place* (Bork-Hüffer, Rafflenbeul, Li, Kraas, & Xue, 2016; Etzold, 2016; Faist, 2016; Fauser & Nijenhuis, 2016). By opening up analysis to multiple scales through mixed-methods understandings, we may place a population space within other Assemblages and uncover the mechanisms and power relations that shape the possibilities. We have considered how the St Andrews assemblage, which is unique within this typology (Figure 6), may be better understood as continually emerging through processes and practices of international student migration, global sporting, and commercial investment: in a global context rather than the Scottish one.

A relational population geography would have to focus on both human and non-human action, relations, association, and emergence. The population classification presented shows that this cannot be easily captured by technical knowledges. We need to examine the practices of people and organisations in place and develop deeper understandings of the context of place. It is understanding "how" the interaction of populations, space, and place play out that the Assemblage ontology shows great potential to uncover the complexity of processes and practice.

Population geography, as a subdiscipline renowned and respected for its rigour, is in a position to shift relational knowledges towards the impact agenda. The opportunity is greatest where relational knowledges created by population geographers are valued as of equal worth to technical knowledges. To do so would open up the potential for planners to make use of the emerging capacities of population spaces/places and the relevant power structures that enable place to "answer back." This would allow policy and planning practice to plan for towns across multiple scales. This is important when considering

the wider discourses around resilience and spatiality, and Massey's (2005) challenge for policy to practice space differently.

## 7 | CONCLUSIONS

This paper, and the sociodemographic typology presented, shows the limitations of technical knowledges using secondary data when trying to understand how population places are constructed. Technical knowledges are alone, limited, as space remains codex, fixed in scale and time. This is demonstrated in our example of how "geographies" and data-based approaches are shaped by those who are collecting the data and for what purpose they are "Rendering Technical." This has prevented a full understanding of the importance of context and the internal relationship between the characteristics of place and the capacity to "answer back."

Bailey's (2005) interpretation of space and place in population geography was visionary in identifying the need for population geographers to interpret how "emergence" might be identified from traditional demographic data (even before the assemblage thinking became a key theme in human geography). However, in this paper, the typology alone could not deal with emergence. We suggested that places show evidence of emergence but were unable to link this to the contingency in social and demographic phenomena as they were measured. Perhaps a study that looks at longitudinal data could do this better. Yet there are other practices and processes which shape space/place in complex ways, beyond practices of rendering technical that feedback to communities, policy, and planning. Therefore, we have concluded that in order to properly respond to emergence and contingency in Scottish coastal communities, a second phase of qualitative fieldwork is needed in order to provide the in-depth, placed-based understanding.

Finally, alongside Stockdale (2016), we call population geographers to recognise the messiness and complexity in population issues. We hope that Assemblage thinking may be a starting point for population geographers to get at the practices and relationships from which agency emerges to achieve a truly relational understanding. This leads us to perhaps the greatest challenge facing the relational turn in population geography. This is to identify emergence rather than technical projection. The social at any scale of population is not complete. The relationship to space-time means that there are social processes specific to context that are not yet theorised (Little, 2008). Provocatively, this frames our relational understandings as emerging alongside the societies and populations we look to research. Although this opens the field up to knowledge collaboration with populations, this would ultimately challenge the "intimate relationship" and intellectual standing that population geographers have with the state and state-produced knowledge (Bailey, 2005, p. 193; White & Jackson, 1995).

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